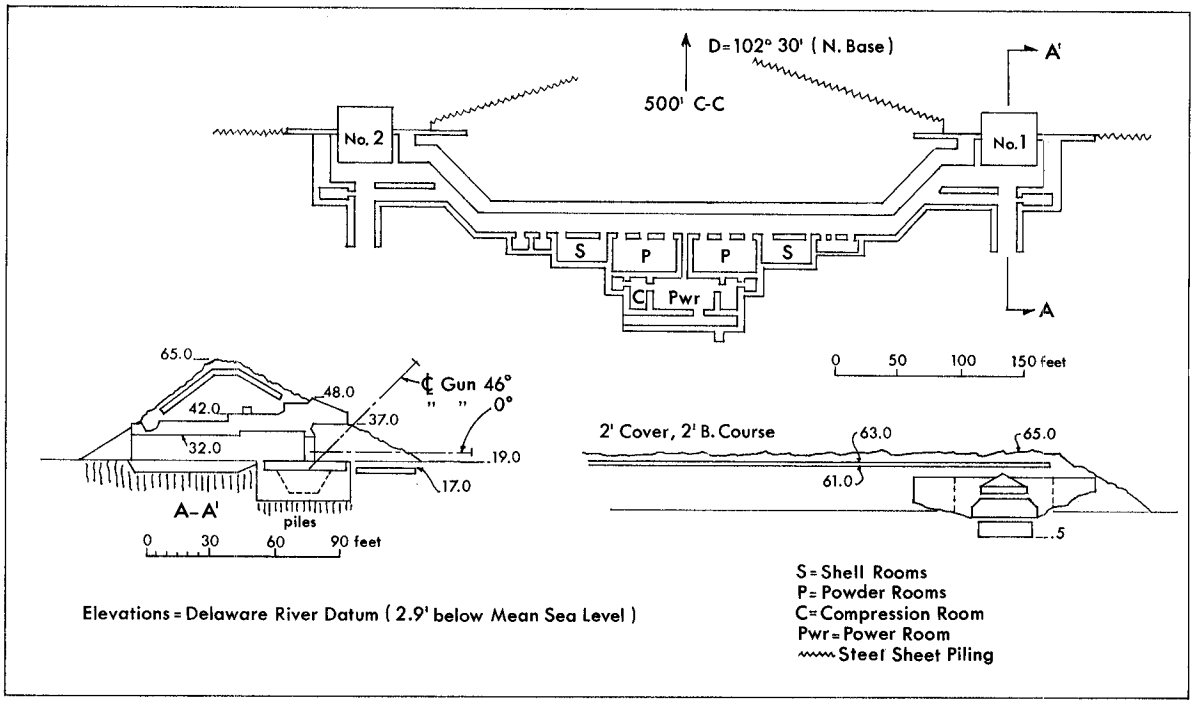
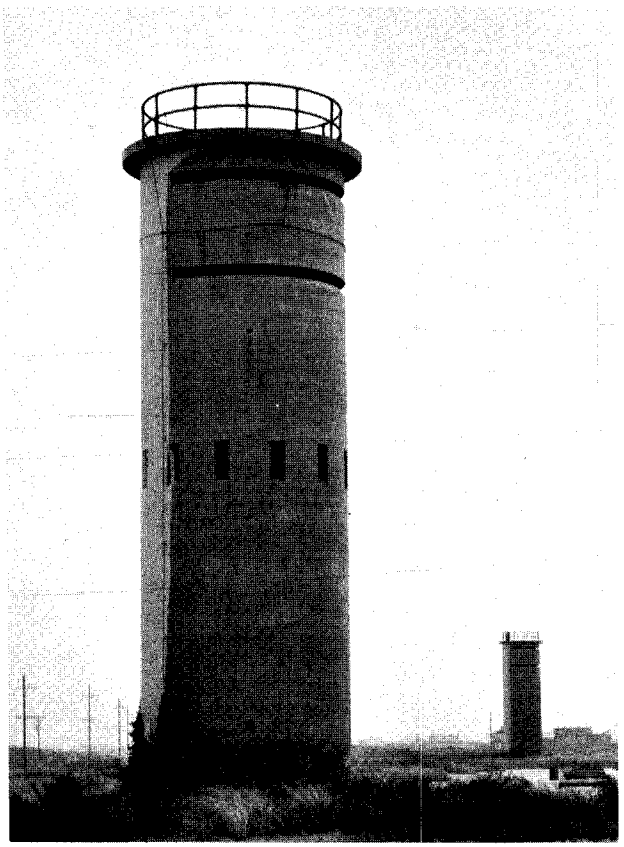


Battery #118 (Smith), Fort Miles, Delaware, near Cape Henlopen. The massive 16-inch rifles of this Battery, protected by over twenty feet of concrete and earth, guarded the entrance to Delaware Bay. A proposed sister 16-inch battery (#119) was never built, but was superseded by a 12-inch battery (#519) in 1942, utilizing two 12-inch artillery rifles on Model 1917 carriages transferred from Fort Saulsbury.

—E. R. Lewis

Cape May shore, seal off the entire Delaware River basin from seaward assault. The Fort Miles project was the District's first new assignment in what was eventually to become a full-blown military construction program. In addition to the camouflaged coastal guns and their concrete emplacements, a separate underground concrete mine control center was installed at Fort Miles, so that the mines defending the entrance to Delaware Bay could be detonated independently in case of emergency. During the war, coastal fire control towers were installed along the New Jersey and Delaware coasts, above and below the Miles and Cape May emplacements, to permit triangulation of the big guns on possible seaward targets.

In 1940 Congress permitted the Secretary of War to transfer part (one-third) of the Military Construction Program—specifically all Air Corps construction and all work on Atlantic Island bases—from the Constructing Quartermaster to the Corps of Engineers. By 1941, it was found to be more institutionally appropriate to transfer the entire program to the Engineers. In a memorandum to the President of 28 August 1941, Under Secretary of War Patterson speaks of having drafted ...



Coastal fire control towers, Rehoboth Beach, Delaware.

Under Secretary of War, Robert P. Patterson, 1891-1952. His support of the Corps of Engineers was a major factor in the President's decision to transfer the entire military construction mission to the Corps.

—Library of Congress

> *a bill which will put all Army construction work with the Engineers. It seems plain: First, that responsibility for construction work should be concentrated in one branch; Second, that the Corps of Engineers is the branch best suited for handling the work.*
>
> *The Engineers, as you know, do a great deal of civilian construction in normal times, rivers and harbors, flood control, etc., and are a going concern. The Quartermaster, on the other hand, has normally no adequate organization to handle construction. If we had the Engineers on the entire construction program last year, they would have moved in with an experienced organization and much waste would have been avoided.*[28]

Even before Senate Bill 1884 passed both houses of the 77th Congress, and was signed into law by the President on 1 December 1941, the Philadelphia Engineer District moved to expedite the transfer. A memorandum dated 17 October 1941 lists the QM projects to be assumed by the Engineers, including "Optical Shops, Storehouses, etc., at Frankford Arsenal, Miscellaneous buildings at the Delaware Ordnance Depot and Warehouse, and the Laboratory at the Philadelphia QM Depot."[29]

By 16 December 1941 the consolidation of the construction services into one three and one-half billion dollar organization under the Corps of Engineers was considered effective.

Prior to Pearl Harbor, the District had engaged in the construction of airports under the aegis of the Civic Aeronautics Authority, as well as its traditional fortification activities. Within a week of the Japanese attack, the Quartermaster Corps Military Construction Program had been transferred to the District, followed shortly by an extensive Marine Construction Program (in addition to the Marine Design Program, transferred here from Washington in 1940).

After the outbreak of war, Division boundaries were changed to agree with those of Army Service Commands, for Military Construction purposes. However, it was not considered practical to change District boundaries. Consequently, the Philadelphia District reported to the Middle Atlantic Division at Baltimore on Military Construction in eastern Pennsylvania, and to the North Atlantic Division in New York on all other Military Construction work. All Marine Construction was to be carried out under direct orders of the Office, Chief of Engineers, as the program was spread out over the country from Boston to Miami to Brownsville, Texas to St. Paul, Minnesota. Sometimes, contracts were made by the Philadelphia office; sometimes they were assigned by Philadelphia to other Districts. Military construction was carried on through a number of area offices, including those at Fort Dix; Fort Dupont; Fort Miles; Fort Monmouth, Picatinny Arsenal; Cape May County Canal; Millville, Mercer, Cape May, Reading, Allentown, and Northeast Airports; Valley Forge and Philadelphia, with sub-offices at Atlantic City and New Castle, Delaware.

Roughly speaking, the Corp's World War II Military Construction Program in the Philadelphia District can be sub-divided in the following manner:

a. Cantonment construction, including the construction of housing, station hospital, mess and recreational facilities at such major posts as Fort Dix, Fort Monmouth, Fort Miles, Fort DuPont, and miscellaneous scattered locations within the District.

b. General hospital programs such as the Valley Forge General Hospital, which this office initiated and carried to substantial completion before transferring jurisdiction to the Baltimore District.

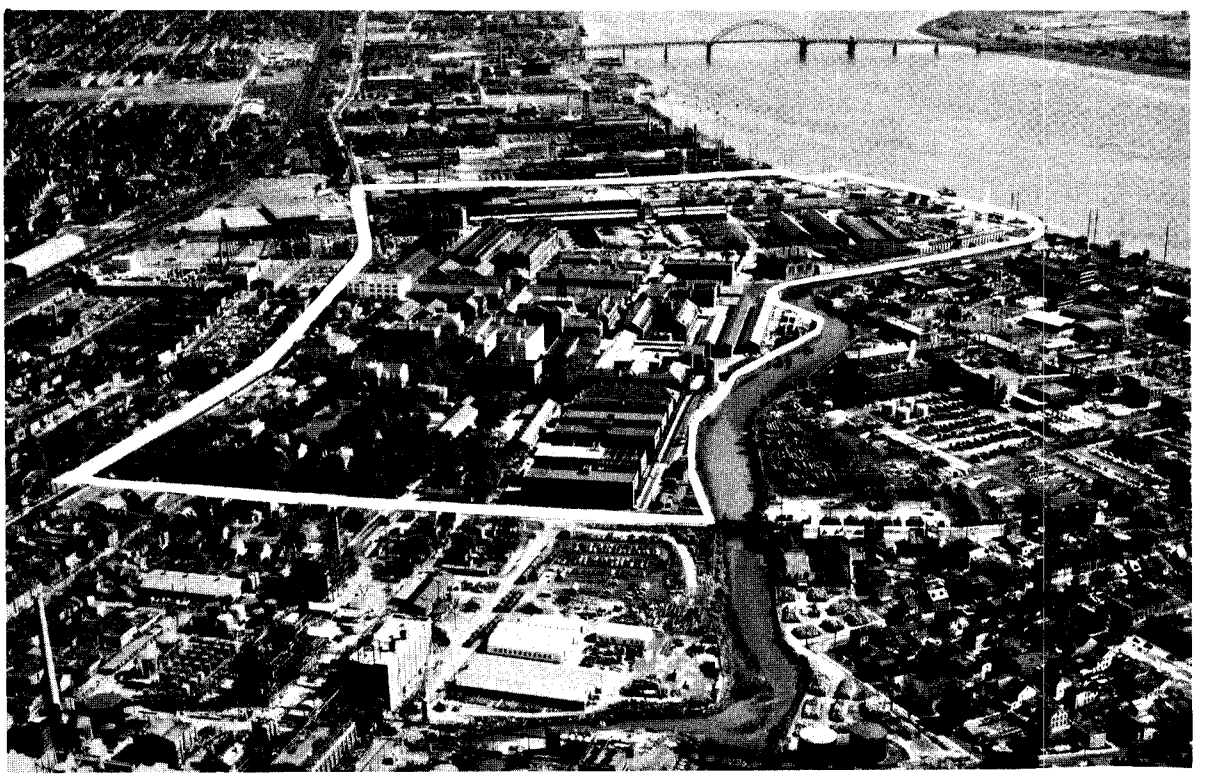
c. Arsenal and Depot construction, such as alterations and renovations to Frankford Arsenal, Philadelphia Quartermaster Depot, Picatinny Arsenal, and Hog Island.

d. Fortifications, such as installations at the main and sub-posts of the Harbor Defense of the Delaware.

e. Air Warning Service, including numerous scattered locations throughout the District.

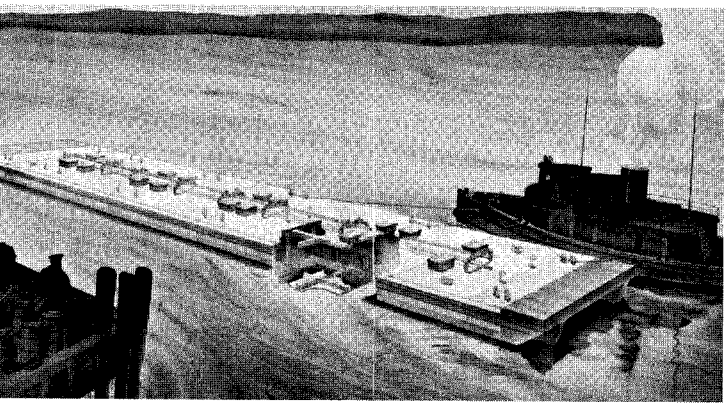
f. Airport construction, which included eleven facilities scattered throughout the States of New Jersey, Pennsylvania, Delaware, and Maryland.

At the end of 1941 the Military Construction Program of the District had a total estimated cost of over $6,000,000, of which about two-thirds was already in place. By December 1942, the program had expanded

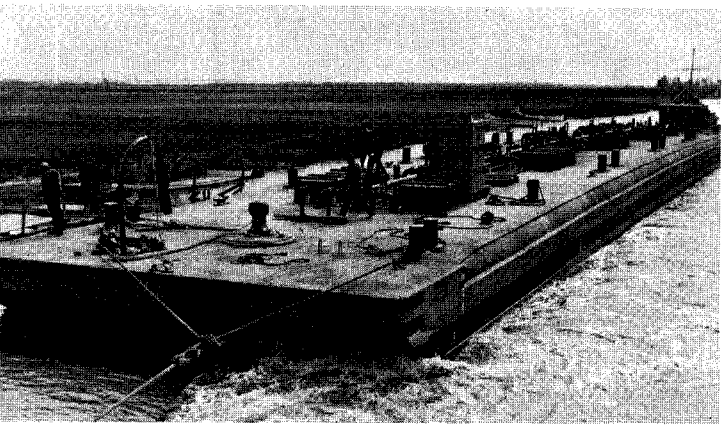


Aerial View of the Frankford Arsenal, Philadelphia. —*U.S. Army Photograph*

Steel Hull 2000 H.P. Twin Screw Towboat, Midway Islands. Measured 180 feet in length by 52 feet in breadth, with a draft of 11 feet. Shown in bow view immediately after a complete 180 degree turn at 185 RPM.



Artist's conception of an experimental concrete oil barge, with cutaway depicting steam piping required to heat the viscous crude oil.



The concrete barge, being towed through the Lewes Canal. The barge measured 195 feet in length by 35 feet in breadth, drew 11 feet of water and displaced 850 DWT. Built in sections which were later joined together, the weight of the reinforcing steel proved so great that the vessel bowed amidships from the strain.

to a total cost of over $111,000,000 (90% in place), and reached close to $150,000,000 (approximately 97% in place) by December 1943. During 1942, the peak year of Military Construction, nearly $100,000,000 worth of construction was completed with approximately $33,000,000 finished in the first nine months of 1943. The largest volume of work per month came during November 1942 with $10,000,000 completed. During 1943, work averaged $3,500,000 per month, or $122,000 per day. More than three and one-half million square yards of paving were laid down as runways, taxiways, and aprons at eleven airport sites under the jurisdiction of the District, roughly equivalent to what would be required to push the forty-eight foot wide Pennsylvania Turnpike from Philadelphia to Washington, D.C.[30]

Under the Marine Construction programs of Marine Design Division, there were two major sub-divisions: the Tug, Barge, and Towboat Program carried out with Defense Plant Corporation funds and the Derrick-Boat Procurement Program for the War Department. The latter $11,000,000 Program started about March 1942 and included 26 fifty-ton derrick barges 8 seventy-five ton assembled derrick barges, and thirty sixty-ton derrick barges, some assembled and others knocked-down for shipment. The $80,000,000 Tug-Barge-Towboat Program was designed to furnish the oil-starved eastern seaboard with equipment to move the vital fluid. The program got underway early in 1943, with the construction of 370 wooden barges, each of 6,000 barrel capacity; 100 eighty-five foot steel tugboats, powered by 600 hp Diesel Engines; 21 two thousand hp Mississippi

River-type steam towboats; and an experimental concrete barge, which failed miserably upon launching, when the empty vessel (which had been designed in anticipation of a shortage of structural steel) rode so low in the water that its decks were almost awash. It was towed to New York harbor, and put into service as a platform for a debris and driftwood incinerator. Later the barge was rammed by a tug and, considered unsalvageable, was taken out to sea and sunk. In May 1943, the Program was enlarged to include construction of 155 welded steel barges, 195 feet long, of which 100 were designed to carry gasoline and 55, dry cargo.[31] Keeping this brief outline of the District's World War II military and maritime construction programs in mind, let us now examine the major programs in a bit more depth.

AIRPORTS

Long before Pearl Harbor, the nation realized that numerous airports would be needed for defensive air operations. Congress reacted by appropriating funds for additional facilities at established airports and the construction of new airports by the Civil Aeronautics Authority.

Realizing the magnitude of the task and the necessity for getting operations underway in the least possible time, the CAA requested the Chief of Engineers to plan and supervise the construction.

Late in December 1940, the Philadelphia Office was granted $553,815 and directed to proceed with the work of providing new airports, each with two runways, at Dover, Delaware, and Millville, New Jersey. Improvement on the existing Allentown-Bethlehem Airport in Pennsylvania by constructing an additional runway was also ordered.

The Preliminary work involved close coordination between District Office and field forces. As quickly as field surveys were finished, detailed plans were drawn and specifications drafted. From this mass of swiftly accumulated data, separate specifications for each airfield were mailed to prospective bidders.

The initial contracts including grading, draining, and paving. Although the ground surface of each selected site was fairly level, soil conditions differed widely for each location. For instance, at Millville, New Jersey, the site was covered by scrub oak and pine on sand, while at Dover, Delaware, a sand base without timber growth presented a different problem, and at Allentown, Pennsylvania, an established airport, the subsoil was heavy with numerous "sink-holes" in underlying limestone—involving still another problem.

Specifications and advertisement for bids for construction of the Millville project were issued in approximately three weeks. Completion of specifications and advertisement for bids on the Dover and Allentown-Bethlehem projects followed within a few days. For its dispatch in this work the District received special commendation from the Chief of Engineers.

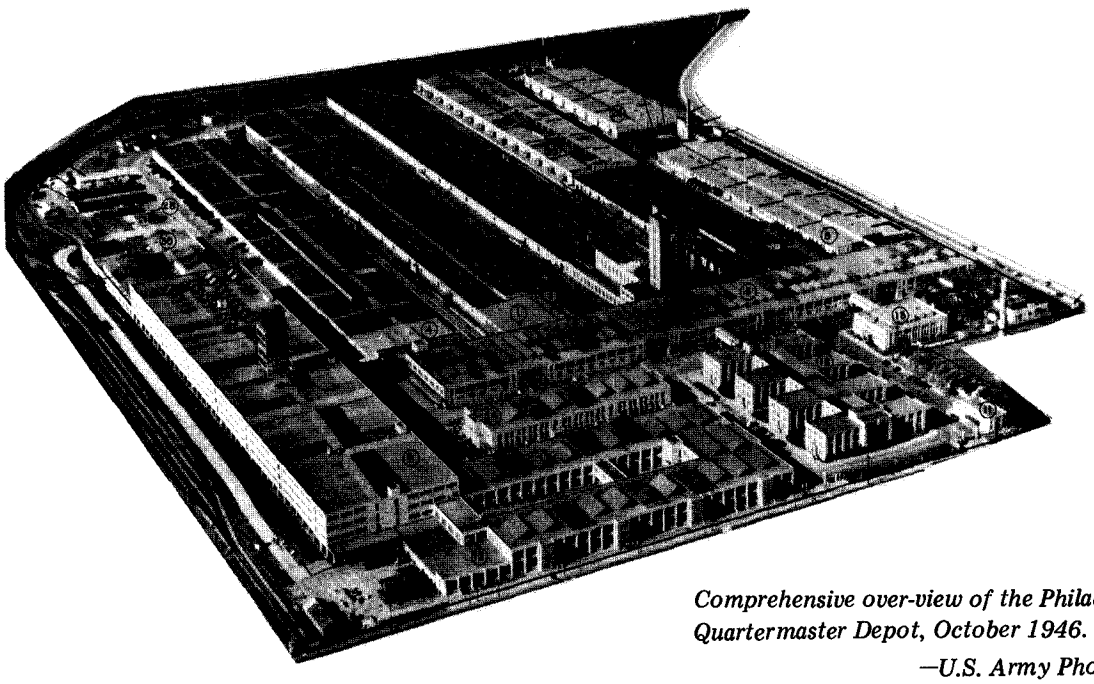
The contracts awarded provided paved runways 4,000 feet long and 100 feet wide with surface-treated shoulders twenty-five feet wide on each side. Turn-arounds were provided at the ends of the runways. The maximum grade allowed on runways was one and one-half percent. Runway elevations were

Aerial view of Northeast Airport, Philadelphia.

selected for the minimum amount of earthwork.

The runway paving at the Millville Airport consisted of a coarse graded aggregate type asphaltic concrete wearing surface two inches thick placed on a compacted base of natural soil after a priming treatment with refined tar. At the Allentown-Bethlehem and Dover Airports, the runways were surfaced with a fine graded aggregate type asphaltic concrete, two-inches thick. At all three of the airports under construction, longitudinal drains of vitrified clay or concrete pipe were placed in trenches parallel to the runways and back-filled with granular material. Work was also done at Reading, Pennsylvania; Cape May, New Jersey and New Castle, Delaware, Airports.[32]

By 16 December 1941, the duties and functions of the Construction Division of the Quartermaster Corps had been transferred to the Corps of Engineers. The contracts in force as of that date involved approximately $30,000,000 in cantonments, ordnance buildings, and supply depots, and expanded the mission of the Philadelphia District considerably. Contracts at Picatinny Arsenal, Dover, New Jersey; Fort Monmouth; Fort Dix; Philadelphia Quartermaster Depot, Signal Corps Depot, and Frankford Arsenal were included in the transfer, with officers in charge of those projects being similarly transferred to the Corps of Engineers and continued in their general capacities under the District Engineer.



Comprehensive over-view of the Philadelphia Quartermaster Depot, October 1946.

—U.S. Army Photograph

Wooden barracks construction, Fort Dix, New Jersey.

—U.S. Army Photograph

In December 1939, there had been 1,044 employees in the District. By December 1941, the number had risen to 2,314 and peaked at 2,961 in April 1942.[33] Initial emphasis at the new Engineer facilities was on the rapid construction of barracks to house the troops now pouring into the area through the selective service system; new school facilities for the troops were also a priority item. Large open structures were built for the mess halls and barracks with a heavy emphasis on "austerity of materials" (regardless of cost). Consequently, standard sixty-three man barracks were built of wood, with the eaves removed to save lumber. In addition, an attempt was made to save steel by using wooden water mains (it failed). The buildings were coal-fueled, a tribute to the power of the coal lobby; later economies included the installation of pot-bellied stoves in the barracks.

Much of the army's austerity program boomeranged. Structures which were designed to last ten years and were subsequently utilized at the time of the Korean conflict were found to be in a stage of severe deterioration (which the missing eaves would have prevented). Moreover, the Corps became unpopular with base commanders, when, acting under the austerity directive, it could not provide the construction quality that the commanders were seeking. This may have negatively affected the careers of a number of Corps officers. Occasionally, more money was spent to obtain an ultimately inferior product, as in the directive that termite shields be removed from building specifications, because they were made of sheet metal. Eventually, wood became scarce and barracks were built from concrete slabs and cinderblocks, perhaps giving impetus to the massive rise in cinderblock construction at the war's end. As an additional economy measure, by 1943 stateside cantonments were being built using standard plans for theater of operations construction.

The District was also extensively involved in the construction of arsenal and ammunition facilities: For the Hog Island ammunition depot, the Corps dredged a channel, and put in roads and railroad tracks, all in the space of a year (May 1940 through May 1941). A similar facility was built at Newark, Delaware. In addition, the Corps expanded the mammoth Picatinny Arsenal in New Jersey, and the Delaware Ordnance Depot. Much of the early World War II construction the District was involved in was done under the cost-plus fixed fee contract system, in which a contractor was guaranteed his legitimate costs, plus a fixed fee, or commission. This type of contract was found to be most efficacious when construction time was a limiting factor.

Responding to the mounting tide of submarine attacks on allied freighters and tankers along the New Jersey coast, which threatened to strangle the flow of oil to the industrial northeast, the Corps of Engineers dug the three mile long Cape May Canal to facilitate the movement of oil and freight barges from Cape May Harbor to Delaware Bay, a project paid for by the U.S. Navy.

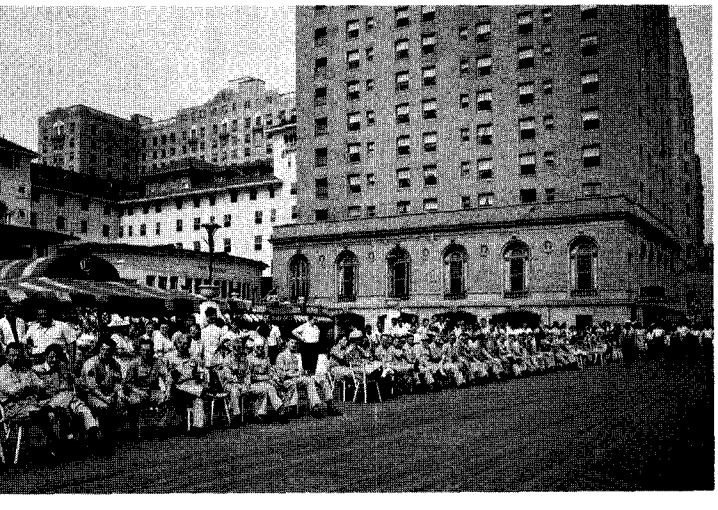
In Atlantic City, New Jersey, the main hotels were taken over and refurbished for government use (rather arbitrarily and without written documents, in the fever pitch of

The Cape May Canal, as seen from Delaware Bay.

emotion following the attack on Pearl Harbor) as barracks, hospitals and recreational facilities; at war's end, they were completely renovated and return to their owners intact. Not all District projects were quite so successful.

The District explored the field of camouflage during the war, at a good deal of effort and expense, and occasionally with less than heartening results. Some of the attempts to camouflage major area industrial facilities failed miserably, as in the attempt to disguise the Delaware Ordnance Depot, a facility with the straightest and longest pier in the Delaware River—by creating a pattern of "forest" from refuse coal.

By late 1943, the Corps began to retrench, and ordered all District area offices closed. By 1 October 1943, the offices at Fort Dupont, Delaware City, Cape May Airport, and Philadelphia Northeast Airport were closed, and their staffs transferred to the District Office in Philadelphia; on 2 February 1944 all area offices in the North Atlantic Division were abolished.[34]



Atlantic City, New Jersey, doffed its mufti and took on wartime dress.

—M. Abrahams

During the war years, the Philadelphia District was given responsibility for military construction projects in both the First and Second Army areas, reporting to the North Atlantic Division at New York City, and the Middle Atlantic Division, at Baltimore, respectively. The projects under the aegis of the North Atlantic Division in 1944 included:

1. The Delaware Ordnance Depot, Pedricktown, New Jersey.
2. Fort Dix, New Jersey.
3. Dover Army Air Field, Delaware.
4. Fort Dupont, Delaware.
5. Fort Miles, Delaware.
6. Millville Army Air Field, New Jersey.
7. Fort Monmouth, New Jersey.
8. New Castle Army Air Base, Delaware.
9. Picatinny Arsenal, Dover, New Jersey.
10. AAF Distribution Command, Atlantic City, New Jersey.
11. AAF Redistribution Center No. 1, Atlantic City, New Jersey.
12. England General Hospital, Atlantic City, New Jersey.

Those projects performed under the authority of the Middle Atlantic Division included:

1. Frankford Arsenal, Philadelphia, Pennsylvania.
2. Philadelphia Cargo Port for Embarkation
   a. Hog Island Terminal.
   b. Newark, Delaware (back-up storage).
3. Penncoyd, Pennsylvania (Ordnance Storage Depot).

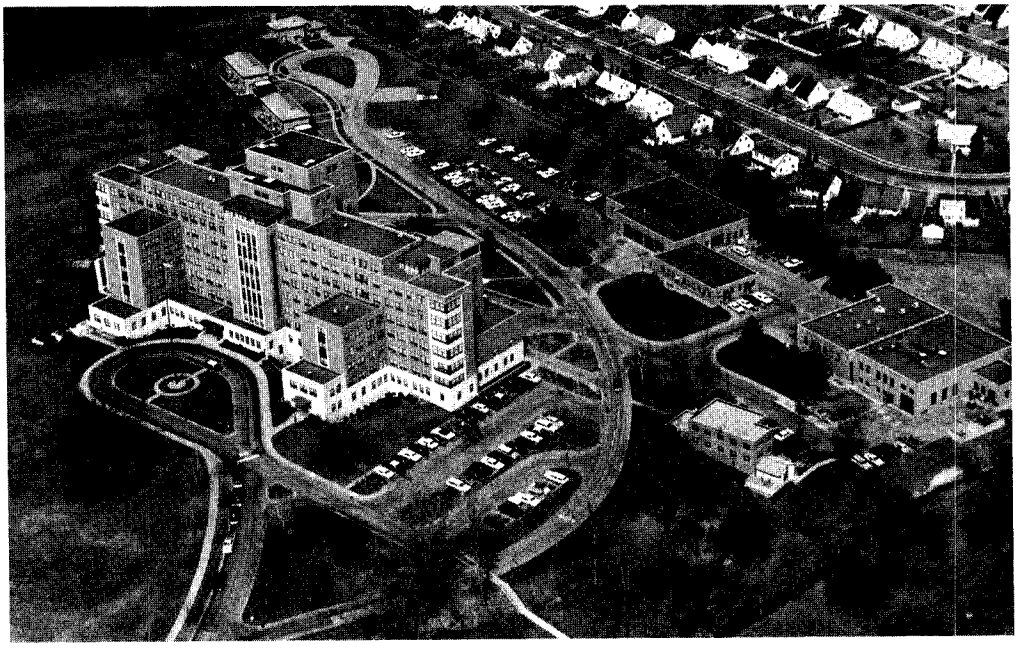
Louis A. Johnson, 1891-1966. Secretary of Defense, 1949-1950.

—Library of Congress

4. Quartermaster Depot, Philadelphia, Pennsylvania.
5. Signal Corps Depot, Philadelphia, Pennsylvania.

Effective 1 October 1944, all military construction projects administered by the Philadelphia District under the North Atlantic Division were transferred to the New York District Office; all military construction administered by the Philadelphia District under the Middle Atlantic Division was transferred to the Baltimore District. This was done partly because, as a part of the North Atlantic Division, the Philadelphia District's territory overlapped the Middle Atlantic Division's area of responsibility, and partly because the Philadelphia District already had an extremely heavy civil work load, and the Corps wanted to distribute the work more evenly.

Following the war, the Department of Defense underwent a significant period of retrenchment, with Secretary of Defense Johnson advocating and carrying out a severe reduction in the size and mission of the defense establishment. During 1947-1948, Philadelphia was awarded a contract under the Veterans Administration to plan and construct a 320 bed hospital at Wilmington, Delaware, and a 1,000 bed hospital at Philadelphia. The District did build the Wilmington Hospital; at Philadelphia, however, the Veterans Administration chose to substitute their own standard-plan 500-bed facility for the Corps' design, and built the hospital themselves.[35]



The Veteran's Administration Hospital, Wilmington, Delaware.